

BAL-12

Linear Active Chilled Beam



PERFORMANCE DATA | 4-PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	THROW		
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM					
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL			TOTAL	ΔP COIL
4	M13	5	15	0.24	15	842	0.70		0.70	1.60	2.90	4.50	3.4	2-3-5			
			20	0.42	18	1048								1070	1087	1096	2-3-5
			25	0.65	21	1238								1271	1296	1309	3-4-6
	M17	5	25	0.27	15	1143							1171	1191	1203	2.3	3-3-6
			35	0.53	20	1450							1499	1534	1553		3-4-7
			40	0.7	21	1582							1644	1686	1709		4-6-8
	M23	5	40	0.21	16	1195							1226	1248	1260	1.9	4-5-7
			60	0.47	22	1583							1643	1685	1708		5-7-9
			75	0.73	25	1830							1916	1974	2006		6-7-10
	M31	6	75	0.24	20	1394							1428	1454	1469	1.3	5-6-8
			100	0.42	23	1708							1765	1805	1827		6-8-11
			130	0.71	28	2034							2121	2181	2213		7-8-11
6	M13	5	20	0.19	16	1156	1.00		2.30	4.20	6.50	3.4	2-3-5				
			30	0.42	21	1546							1591	1623	1641	3-5-8	
			40	0.75	25	1906							1979	2029	2057	4-5-7	
	M17	5	40	0.31	19	1766						1826	1868	1892	2.3	3-5-8	
			50	0.49	22	2050						2139	2199	2232		4-6-9	
			60	0.71	25	2312						2431	2510	2552		5-7-10	
	M23	6	60	0.21	20	1766						1825	1866	1890	1.9	4-6-10	
			85	0.42	24	2235						2342	2413	2452		6-8-11	
			110	0.7	27	2628						2785	2890	2946		7-10-12	
	M31	8 *	110	0.22	22	2020						2085	2132	2158	1.3	6-8-12	
			150	0.42	26	2498						2610	2685	2726		7-10-13	
			190	0.67	29	2910						3070	3178	3235		9-11-14	
8	M13	5	30	0.24	19	1800	1.40		3.00	5.40	8.50	3.4	3-4-8				
			40	0.43	23	2204							2288	2343	2374	3-5-9	
			50	0.67	26	2599							2718	2795	2838	4-6-9	
	M17	6	50	0.28	21	2419						2521	2588	2625	2.3	4-6-8	
			65	0.48	24	2886						3041	3141	3196		5-7-10	
			80	0.72	27	3301						3511	3647	3722		6-8-11	
	M23	8 *	80	0.22	22	2507						2617	2689	2728	1.9	5-7-10	
			110	0.42	26	3093						3273	3390	3454		7-9-13	
			140	0.67	30	3584						3839	4003	4094		8-10-14	
	M31	10 *	140	0.22	25	2533						2637	2705	2743	1.3	7-9-13	
			195	0.42	29	3174						3349	3463	3525		8-10-15	
			250	0.69	34	3710						3962	4125	4214		10-12-17	
10	M13	5	35	0.22	21	2815	1.70		3.80	6.70	10.50	3.4	4-5-9				
			50	0.45	25	3603							3821	3960	4037	4-6-10	
			60	0.64	27	4045							4329	4512	4612	5-7-11	
	M17	6	60	0.27	22	3804						4052	4211	4298	2.3	4-6-9	
			80	0.49	26	4528						4899	5137	5270		5-8-11	
			95	0.69	28	4986						5452	5751	5919		6-9-12	
	M23	8 *	95	0.22	25	3970						4243	4418	4514	1.9	5-8-11	
			135	0.44	29	4880						5322	5605	5764		7-9-12	
			170	0.69	32	5500						6091	6473	6687		8-10-15	
	M31	10 *	170	0.23	28	3784						4029	4186	4272	1.3	7-9-13	
			230	0.41	32	4544						4919	5159	5292		8-11-16	
			290	0.66	40	5162						5670	5997	6180		11-13-18	

NOTES: Reference page C3-20 for operational conditions used for performance notes.

PERFORMANCE DATA | 4-PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE HEATING (Btu/h)								INDUCTION RATIO	THROW
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM			
		in	CFM	(in H ₂ O)		TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL		
4	M13	5	15	0.24	15	1500	0.10	1599	0.20	1620	0.50	1639	1.00	3.4	2-3-5
			20	0.42	18	1844		1997		2037		2068			2-3-5
			25	0.65	21	2158		2367		2427		2471			3-4-6
	M17	5	25	0.27	15	2018		2197		2246		2283		2.3	3-3-6
			35	0.53	20	2517		2804		2893		2955			3-4-7
			40	0.70	21	2727		3069		3180		3256			4-6-8
	M23	5	40	0.21	16	2178		2372		2426		2467		1.9	4-5-7
			60	0.47	22	2840		3178		3288		3363			5-7-9
			75	0.73	25	3259		3706		3860		3966			6-7-10
	M31	6	75	0.24	20	2695		2919		2982		3028		1.3	5-6-8
			100	0.42	23	3285		3621		3724		3796			6-8-11
			130	0.71	28	3902		4372		4529		4637			7-8-11
6	M13	5	20	0.19	16	2041	0.10	2192	0.30	2226	0.80	2255	1.40	3.4	2-3-5
			30	0.42	21	2666		2950		3030		3089			3-5-8
			40	0.75	25	3232		3652		3784		3874			4-5-7
	M17	5	40	0.31	19	3037		3401		3508		3585		2.3	3-5-8
			50	0.49	22	3477		3966		4127		4235			4-6-9
			60	0.71	25	3878		4494		4707		4849			5-7-10
	M23	6	60	0.21	20	3150		3509		3615		3690		1.9	4-6-10
			85	0.42	24	3924		4491		4684		4811			6-8-11
			110	0.70	27	4557		5335		5617		5806			7-10-12
	M31	8 *	110	0.22	22	3835		4239		4356		4441		1.3	6-8-12
			150	0.42	26	4709		5317		5519		5654			7-10-13
			190	0.67	29	5460		6276		6566		6759			9-11-14
8	M13	5	30	0.24	19	3093	0.10	3407	0.50	3494	1.00	3557	1.80	3.4	3-4-8
			40	0.43	23	3709		4190		4341		4441			3-5-9
			50	0.67	26	4308		4957		5171		5310			4-6-9
	M17	6	50	0.28	21	4062		4632		4816		4936		2.3	4-6-8
			65	0.48	24	4752		5556		5834		6016			5-7-10
			80	0.72	27	5348		6385		6764		7009			6-8-11
	M23	8 *	80	0.22	22	4348		4954		5152		5281		1.9	5-7-10
			110	0.42	26	5257		6172		6497		6709			7-9-13
			140	0.67	30	6005		7220		7681		7976			8-10-14
	M31	10 *	140	0.22	25	4741		5326		5513		5636		1.3	7-9-13
			195	0.42	29	5877		6780		7095		7300			8-10-15
			250	0.69	34	6829		8045		8499		8792			10-12-17
10	M13	5	35	0.22	21	4572	0.10	5265	0.60	5491	1.30	5638	2.30	3.4	4-5-9
			50	0.45	25	5662		6766		7159		7411			4-6-10
			60	0.64	27	6239		7618		8130		8459			5-7-11
	M17	6	60	0.27	22	5954		7183		7630		7917		2.3	4-6-9
			80	0.49	26	6883		8596		9266		9695			5-8-11
			95	0.69	28	7448		9503		10344		10884			6-9-12
	M23	8 *	95	0.22	25	6340		7672		8164		8479		1.9	5-8-11
			135	0.44	29	7559		9530		10326		10837			7-9-12
			170	0.69	32	8361		10837		11903		12591			8-10-15
	M31	10 *	170	0.23	28	6527		7743		8185		8468		1.3	7-9-13
			230	0.41	32	7715		9439		10114		10547			8-11-16
			290	0.66	40	8683		10879		11795		12384			11-13-18

NOTES: Reference page C3-20 for operational conditions used for performance notes.

BAL-12

Linear Active Chilled Beam



PERFORMANCE DATA | 2-PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	THROW		
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM					
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL			TOTAL	ΔP COIL
4	M13	5	15	0.24	15	884	1.00	2.20	896	3.80	907	6.00	913	3.4	2-3-5		
			20	0.42	18	1100			1123		1141		1151		2-3-5		
			25	0.65	21	1300			1335		1360		1375		3-4-6		
	M17	5	25	0.27	15	1200			1229		1251		1263	2.3	1263	1263	3-3-6
			35	0.53	20	1522			1574		1610		1631		3-4-7		
			40	0.70	21	1661			1726		1770		1795		4-6-8		
	M23	5	40	0.21	16	1255			1287		1310		1323	1.9	1323	1323	4-5-7
			60	0.47	22	1662			1725		1769		1793		5-7-9		
			75	0.73	25	1922			2011		2073		2106		6-7-10		
	M31	6	75	0.24	20	1463			1500		1527		1542	1.3	1542	1542	5-6-8
			100	0.42	23	1793			1853		1895		1919		6-8-11		
			130	0.71	28	2135			2227		2290		2324		7-8-11		
6	M13	5	20	0.19	16	1213	1.40	3.10	1233	5.50	1250	8.70	1258	3.4	2-3-5		
			30	0.42	21	1623			1670		1704		1723		3-5-8		
			40	0.75	25	2001			2077		2130		2159		4-5-7		
	M17	5	40	0.31	19	1854			1917		1961		1986	2.3	1986	1986	3-5-8
			50	0.49	22	2152			2245		2308		2343		4-6-9		
			60	0.71	25	2427			2562		2635		2680		5-7-10		
	M23	6	60	0.21	20	1854			1916		1960		1984	1.9	1984	1984	4-6-10
			85	0.42	24	2347			2459		2534		2575		6-8-11		
			110	0.70	27	2760			2924		3034		3093		7-10-12		
	M31	8 *	110	0.22	22	2121			2190		2239		2266	1.3	2266	2266	6-8-12
			150	0.42	26	2623			2740		2819		2863		7-10-13		
			190	0.67	29	3055			3223		3336		3397		9-11-14		
8	M13	5	30	0.24	19	1889	1.80	4.10	1940	7.30	1977	2.70	1996	3.4	3-4-8		
			40	0.43	23	2314			2402		2460		2492		3-5-9		
			50	0.67	26	2729			2854		2935		2979		4-6-9		
	M17	6	50	0.28	21	2540			2647		2717		2756	2.3	2756	2756	4-6-8
			65	0.48	24	3030			3193		3298		3356		5-7-10		
			80	0.72	27	3466			3687		3829		3907		6-8-11		
	M23	8	80	0.22	22	2633			2748		2823		2864	1.9	2864	2864	5-7-10
			110	0.42	26	3247			3436		3559		3626		7-9-13		
			140	0.67	30	3762			4031		4203		4298		8-10-14		
	M31	10 *	140	0.22	25	2659			2769		2840		2880	1.3	2880	2880	7-9-13
			195	0.42	29	3332			3516		3635		3700		8-10-15		
			250	0.69	34	3896			4160		4330		4424		10-12-17		
10	M13	5	35	0.22	21	2956	2.20	5.00	3088	8.90	3173	3.70	3220	3.4	4-5-9		
			50	0.45	25	3782			4012		4158		4238		4-6-10		
			60	0.64	27	4247			4545		4737		4842		5-7-11		
	M17	6	60	0.27	22	3994			4254		4421		4513	2.3	4513	4513	4-6-9
			80	0.49	26	4754			5143		5394		5533		5-8-11		
			95	0.69	28	5234			5724		6038		6215		6-9-12		
	M23	8 *	95	0.22	25	4168			4454		4638		4739	1.9	4739	4739	5-8-11
			135	0.44	29	5124			5587		5885		6051		7-9-12		
			170	0.69	32	5774			6395		6796		7021		8-10-15		
	M31	10 *	170	0.23	28	3973			4230		4395		4485	1.3	4485	4485	7-9-13
			230	0.41	32	4771			5164		5416		5556		8-11-16		
			290	0.66	40	5420			5953		6296		6488		11-13-18		

NOTES: Reference page C3-20 for operational conditions used for performance notes.

PERFORMANCE DATA | 2-PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE HEATING (Btu/h)								INDUCTION RATIO	THROW			
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM						
		in	CFM	(in H ₂ O)		TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL					
4	M13	5	15	0.24	15	2417	0.20	2580	1.00	2613	2.20	2646	3.80	3.4	2-3-5			
			20	0.42	18	2966									3218	3282	3334	2-3-5
			25	0.65	21	3465									3810	3908	3981	3-4-6
	M17	5	25	0.27	15	3234								3629	3609	3670	2.3	3-3-6
			35	0.53	20	4020								4493	4639	4741		3-4-7
			40	0.70	21	4349								4912	5096	5220		4-6-8
	M23	5	40	0.21	16	3445								3764	3854	3921	1.9	4-5-7
			60	0.47	22	4466								5022	5202	5325		5-7-9
			75	0.73	25	5101								5839	6092	6266		6-7-10
	M31	6	75	0.24	20	4174								4543	4646	4722	1.3	5-6-8
			100	0.42	23	5057								5610	5780	5898		6-8-11
			130	0.71	28	5968								6741	7001	7177		7-8-11
6	M13	5	20	0.19	16	3290	0.30	3638	1.40	3594	3.10	3642	5.50	3.4	2-3-5			
			30	0.42	21	4284									4751	4883	4980	3-5-8
			40	0.75	25	5180									5872	6088	6238	4-5-7
	M17	5	40	0.31	19	4859								5458	5635	5761	2.3	3-5-8
			50	0.49	22	5549								6353	6618	6796		4-6-9
			60	0.71	25	6174								7187	7539	7773		5-7-10
	M23	6	60	0.21	20	4975								5567	5740	5864	1.9	4-6-10
			85	0.42	24	6161								7095	7412	7623		6-8-11
			110	0.70	27	7116								8397	8861	9172		7-10-12
	M31	8 *	110	0.22	22	5928								6592	6786	6924	1.3	6-8-12
			150	0.42	26	7227								8227	8560	8782		7-10-13
			190	0.57	29	8321								9665	10142	10461		9-11-14
8	M13	5	30	0.24	19	4986	0.50	5503	1.80	5647	4.10	5749	7.30	3.4	3-4-8			
			40	0.43	23	5966									6758	7005	7171	3-5-9
			50	0.67	26	6916									7984	8337	8567	4-6-9
	M17	6	50	0.28	21	6512								7450	7753	7951	2.3	4-6-8
			65	0.48	24	7595								8918	9377	9675		5-7-10
			80	0.72	27	8523								10231	10854	11258		6-8-11
	M23	8	80	0.22	22	6877								7875	8201	8413	1.9	5-7-10
			110	0.42	26	8269								9775	10310	10658		7-9-13
			140	0.67	30	9395								11394	12153	12640		8-10-14
	M31	10 *	140	0.22	25	7315								8277	8585	8788	1.3	7-9-13
			196	0.42	29	8992								10477	10996	11334		8-10-15
			250	0.69	34	10365								12367	13115	13596		10-12-17
10	M13	5	35	0.22	21	7403	0.60	8545	2.20	8917	5.00	9159	8.90	3.4	4-5-9			
			50	0.45	25	9146									10963	11610	12024	4-6-10
			60	0.64	27	10061									12331	13173	13714	5-7-11
	M17	6	60	0.27	22	9591								11614	12350	12822	2.3	4-6-9
			80	0.49	26	11051								13871	14972	15679		5-8-11
			95	0.69	28	11927								15310	16695	17583		6-9-12
	M23	8 *	95	0.22	25	10104								12297	13106	13625	1.9	5-8-11
			135	0.44	29	11970								15215	16526	17366		7-9-12
			170	0.69	32	13168								17243	18998	20130		8-10-15
	M31	10 *	170	0.23	28	10149								12151	12878	13344	1.3	7-9-13
			230	0.41	32	11894								14733	15844	16557		8-11-16
			290	0.66	40	13277								16893	18401	19369		11-13-18

NOTES: Reference page C3-20 for operational conditions used for performance notes.

PERFORMANCE DATA**NOTES:**

1. All performance data based on test performed in accordance with ASHRAE Standard 200-2018.
2. ΔP_s values are measured in inches of water.
3. NC values are based on room absorption of 10 dB. A dash (-) indicates an NC value less than 15.
4. Throw values are based on isothermal supply air and represent throw distances to terminal velocities of 150, 100 and 50 fpm respectively.
5. ΔP_{Coil} values are measured in inches of water. ΔP_{Coil} values in shaded cells indicate use of a two circuit coil. All other values represent a single circuit coil.
6. Induction ratio is multiplied by the volume flow rate of primary air to estimate the volume flow rate of room air entrained through the coil.
7. * denotes oval inlet air connection.

COOLING PERFORMANCE:

- Cooling capacity listed (TOTAL) is the total sensible heat removal by the beam's integral coil. It does not include any contribution or offset by the primary air.
- Capacity is based on 18°F ΔT between the induced air and the chilled water supply. Table 1 provides correction factors for other temperature differentials.

- Primary air sensible cooling contribution can be calculated by the following equation:

$$q_{\text{SENSPA}} = 1.085 \times \text{CFM}_{\text{PA}} \times (T_{\text{ROOM}} - T_{\text{PA}})$$

- Primary air latent cooling can be calculated by the following equation:

$$q_{\text{LATENT}} = 0.69 \times \text{CFM}_{\text{PA}} \times (W_{\text{ROOM}} - W_{\text{PA}})$$

where W_{ROOM} and W_{PA} are the humidity ratio of the room and primary air respectively expressed in Grains of moisture per pound dry air.

TABLE 4: CORRECTION FOR (ΔT) BETWEEN ENTERING AIR AND ENTERING CHILLED WATER

ACTUAL ΔT	10	12	14	16	18	20	22	24
MULTIPLY TABLE VALUE BY:	0.56	0.67	0.78	0.89	1.00	1.11	1.22	1.33

HEATING PERFORMANCE:

- Heating capacity listed (TOTAL) is the sensible heat added by the beam's integral coil. It does not include any contribution or offset by the primary air.
- Capacity is based on 50°F ΔT between the induced air and the heating water supply. Table 2 provides correction factors for other temperature differentials.
- Primary air sensible heating offset (or contribution) can be calculated by the following equation:

$$q_{\text{SENSPA}} = 1.085 \times \text{CFM}_{\text{PA}} \times (T_{\text{PA}} - T_{\text{ROOM}})$$

- If the primary air temperature is lower than that of the room, it will offset the coil's heating.
- If the primary air temperature is higher than that of the room, it will contribute to the coil's heating.

TABLE 2: CORRECTION FOR (ΔT) BETWEEN ENTERING AIR AND ENTERING CHILLED WATER

ACTUAL ΔT	20	30	40	50	60	70	80	90	100	110	120
MULTIPLY TABLE VALUE BY:	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40

LEGEND:

ΔP_s = Unit Inlet Pressure [in wg]

q_{Coil} = Sensible Capacity, Coil [Btu/h]

ΔP_{Coil} = Water coil pressure drop [ft wg]

q_{SENSPA} = Sensible Capacity, Primary Air [Btu/h]

W_{ROOM} = Humidity Ratio of the Room

CFM_{PA} = Air Flowrate, Primary Air [CFM]

T_{PA} = Temperature Primary Air [°F]

T_{ROOM} = Temperature Room Air [°F]

q_{LATENT} = Latent Capacity, Primary Air [Btu/h]

W_{PA} = Humidity Ratio of the Primary Air